

**The effect of different levels of supplementary feed on the production of
finisher ostriches (*Struthio camelus*) grazing irrigated lucerne (*Medicago
sativa*) pastures**

by

Marliné Strydom

Thesis presented in partial fulfillment of the requirements for the degree of
MASTER OF SCIENCE IN AGRICULTURE (ANIMAL SCIENCES)

at
Stellenbosch University

Department of Animal Sciences
Faculty of AgriSciences

Supervisor: Prof. T.S. Brand
Co-Supervisors: Dr. J.M. van Heerden
Mr. J.W. Jordaan

Date: December 2010

Abstract

The purpose of this study was to evaluate the production of slaughter ostriches in a grazing environment at different levels of supplementary feed.

Two grazing trials were conducted. In the first trial, one group of finisher ostriches (six months old) was put into a feedlot and received a complete finisher diet. The other four groups were allowed to graze lucerne pasture (stocking rate of 15 birds/ha) with 1500, 1000, 500, and 0g supplementary feed/bird/day. Pasture production and intake were measured. There was no difference ($P > 0.05$) between the end mean live weights of the feedlot ostriches and those two grazing groups receiving 1500 or 1000g supplementation. The average daily gain (ADG) of the group receiving 1000g supplementation was lower ($P < 0.05$) than the ADG of the group receiving 1500g supplementation, but all three groups reached a mean target slaughter weight of 95kg within the 154 days of the study. Therefore, pastures together with the correct supplementation (at least 1000g/bird/day) can replace complete feeds in the finishing phase of slaughter ostriches and can play an important role in the production of these birds. For lucerne intake, a quadratic relationship ($P < 0.01$) was found between pasture dry matter (DM) intake (g/bird/day) and supplementary feed intake (g/bird/day). The maximum lucerne intake level (1692.8g/bird/day) was achieved at 619.6g supplementary feed/bird/day.

In the second grazing trial, finisher ostriches were allowed to graze lucerne pastures at two different stocking rates (10 and 15 birds/ha) while receiving either 0 or 800g supplementary feed/bird/day. Ostriches receiving supplementation had higher ($P < 0.05$) mean end live weights than ostriches receiving no supplementation. Ostriches receiving supplementation reached a mean target slaughter weight of 95kg within the timespan of the trial, but ostriches receiving no supplementation did not. Stocking rate had no influence on mean end live weight of the birds. An interaction ($P < 0.05$) was found between the level of supplementation and stocking rate for ADG of the birds. Stocking rate influenced ADG only for birds receiving no supplementation. As stocking rate increased, ADG of birds receiving no supplementation declined. Results of the pasture data indicated an increasing level of replacement of grazed lucerne DM by supplementary feed as the trial progressed and this was more pronounced at the higher stocking rate of 15 birds per hectare. A high stocking rate seems to have had a gradual depressing effect on lucerne DM production, while the less severe levels of defoliation at a lower stocking rate promoted lucerne DM production.

A digestibility trial was conducted with mature ostriches (12 months old) to investigate the effect of supplementation on intake and digestibility of nutrients, as well as to investigate the substitution effect that ostriches may display when they receive supplementary feed in addition to grazing. The same dietary

treatments as in the first grazing study were given to ostriches while they were kept in metabolism crates. These diets were also fed to 20-week old roosters to obtain energy values for these diets for roosters. These energy values would be used to predict ostrich energy values for the same diets by means of a regression equation. For the roosters, each diet treatment was mixed with 50% maize to prevent digestive disorders and ensure maximum feed intake. Ostriches started to substitute supplementary feed for pasture when supplementation was supplied at levels higher than 62% (i.e. 1000g supplementary feed/bird/day) of total feed intake. For each increase of 100g in supplementary feed intake, pasture was replaced at a rate of 4.9%. Higher ($P < 0.05$) total feed intakes were reached by ostriches if they grazed lucerne pastures and received supplementation than if they grazed pasture alone. Pasture grazing alone had lower ($P < 0.05$) dry matter digestibility (DMD) and apparent metabolizable energy (AME) values for both ostriches and roosters than if pastures were supplied with a supplement. A significant stepwise regression could not be computed for the prediction of ostrich AME values from rooster AME values.

The economics of different feeding systems (extensive versus intensive) were evaluated with an economic analysis, which was based on the same materials and methods and results of the first grazing trial. A margin above feed cost (MAFC) analysis was performed to evaluate the economic viability of the different feeding systems. The present value (PV) of the MAFC for the pasture-based system with 1000g/bird/day supplementation was only 8.3% lower than that of the feedlot system over a period of six years, while the PV of the cost of the same pasture-based system was 78.4% lower than that of the feedlot system. Birds finished on lucerne pasture with 1000g supplementation led to a saving of 57% in feeding costs if compared to a feedlot system. A sensitivity analysis of the MAFC revealed that the pasture-based system was less sensitive to changes in feeding costs than the feedlot system. Therefore, the unique circumstances of each ostrich producer will play a role in the decision whether to raise ostriches in a feedlot or on pastures

Opsomming

Die produksie van slagvolstruise in 'n ekstensiewe weidingsstelsel met verskillende vlakke van aanvullende voeding is gedurende hierdie studie ge-evalueer.

Twee weidingsstudies is uitgevoer. In die eerste studie is een groep afrondingsvolstruise (ses maande oud) in 'n voerkraal geplaas en 'n volledige afrondingsdieet gevoer. Die ander vier groepe is op besproeide lusernweiding geplaas (teen 'n weidigheid van 15 voëls/ha) en het onderskeidelik 1500, 1000, 500 en 0g aanvullende voeding/voël/dag ontvang. Weidingproduksie en -inname is gemeet. Daar was geen verskil ($P > 0.05$) tussen die eindgewigte van die voerkraal volstruise en dié van die weidende voëls wat onderskeidelik 1500 en 1000g aanvullende voeding ontvang het nie. Die gemiddelde daaglikse toename (GDT) van die groep weidende voëls wat 1000g aanvullende voeding ontvang het was laer ($P < 0.05$) as die GDT van die groep weidende voëls wat 1500g aanvullende voeding ontvang het, maar al drie hierdie groepe het 'n gemiddelde teiken slaggewig van 95kg bereik binne die 154 dae van die studie. Weiding, tesame met die korrekte aanvullende voeding (van ten minste 1000g/voël/dag) kan volvoer rantsoene in die afrondingsfase van slagvolstruise vervang en kan dus 'n belangrike rol speel ten opsigte van die produksie van hierdie voëls. Vir lusern inname is 'n kwadratiese passing ($P < 0.01$) tussen weiding droë materiaal (DM) inname (g/voël/dag) en aanvullende voeding inname (g/voël/dag) gevind. Die maksimum lusern inname (1692.8g/voël/dag) is bereik wanneer voëls 619.6g aanvullende voeding/voël/dag ingeneem het.

In die tweede weidingsstudie, is afrondingsvolstruise (6 maande oud) toegelaat om lusern te beweï teen twee verskillende weidighede (10 en 15 voëls/ha) en het ook 0 of 800g aanvullende voeding/voël/dag ontvang. Volstruise wat aanvullende voeding ontvang het, het hoër ($P < 0.05$) gemiddelde eindgewigte bereik as volstruise wat geen aanvullende voeding ontvang het nie. Volstruise wat aanvullende voeding ontvang het, het ook die teiken slaggewig van 95kg bereik binne die tydskuur van die studie, terwyl die volstruise wat geen aanvullende voeding ontvang het nie, nie daarin kon slag nie. Weidigheid het nie 'n invloed ($P > 0.05$) gehad op die eindgewigte van die voëls nie, maar 'n interaksie ($P < 0.05$) is gevind tussen vlak van aanvullende voeding en weidigheid wat GDT van die voëls betref. Weidigheid het GDT beïnvloed slegs vir volstruise wat geen aanvullende voeding ontvang het nie. Soos die weidigheid van die voëls wat geen aanvullende voeding ontvang het nie, toegeneem het, het die GDT van hierdie voëls afgeneem. Ontleding van die weidingsdata het 'n toenemende vlak van verplasing van die weiding met aanvullende voeding getoon soos die studie gevorder het en dit was meer merkbaar by die hoër weidigheid. Die hoër weidigheid het ook gelei tot 'n geleidelike afname in lusern DM produksie, terwyl die minder aggressiewe vlakke van ontblaring by die laer weidigheid lusern DM produksie bevorder het.

'n Verteringsstudie is gedoen met volwasse volstruise (12 maande oud) om die invloed van aanvullende voeding

op inname en verteerbaarheid van nutriente te toets, asook om die substitusie effek wat volstruise mag toon wanneer hulle aanvullende voeding ontvang op weiding, te ondersoek. Dieselfde dieet behandelings as in die eerste weidingsstudie is vir die volstruise gegee terwyl hulle in metabolisme kratte aangehou is. Hierdie diëte is ook aan 20-week oue hane gevoer om die energie waardes van die diete vir hane te verkry. Hierdie energiewaardes sal dan gebruik word om volstruis energiewaardes te voorspel vir dieselfde diëte met behulp van 'n regressie vergelyking. Vir die hane is elke dieet gemeng met 50% mielies om inname te handhaaf en spysverteringsstoornisse te voorkom. Volstruise het weiding begin verplaas met aanvullende voeding sodra die vlak van aanvullende voeding hoër as 62% (d.i. meer as 1000g aanvullende voeding/voël/dag) van die totale inname van die voëls was. Vir elke 100g toename in aanvullende voeding, word weiding verplaas teen 'n tempo van 4.9%. Weiding, tesame met aanvullende voeding, het gelei tot hoër totale droë materiaal (DM) voerinnames by volstruise as wanneer weiding alleen beskikbaar was. Wanneer weiding alleen voorsien was, was daar laer ($P < 0.05$) verteerbaarhede van DM en waarskynlike metaboliseerbare energie (WME) waardes vir beide volstruise en hane as wanneer die weiding voorsien word met aanvullende voeding. Geen betekenisvolle stapsgewyse regressie kon gevind word om volstruis energie waardes uit hoender energie waardes te voorspel nie.

Die ekonomie van verskillende sisteme (ekstensief versus intensief) is in hierdie studie vergelyk en is gebaseer op dieselfde materiaal en metodes en resultate van die eerste weidingsstudie. 'n Marge bo voerkoste analise is gebruik om die ekonomiese lewensvatbaarheid van die sisteme met mekaar te vergelyk. Die huidige waarde van die marge bo voerkoste van die weidingssisteem waar 1000g aanvullende voeding gevoer word was 8.3% laer as dié van die voerkraal sisteem oor 'n periode van ses jaar. Daarteenoor was die huidige waarde van die koste van dieselfde weidingssisteem 78.4% laer as dié van die voerkraal sisteem. Die weidingssisteem waar volstruise 1000g aanvullende voeding ontvang het, het 'n besparing van 57% in voerkoste getoon wanneer dit met die voerkraal volstruise vergelyk is. 'n Sensitiwiteitsanalise van die marge bo voerkoste het getoon dat die weidingssisteem minder sensitief is vir wisselende voerkoste as die voerkraal sisteem. Die unieke omstandighede van elke produsent sal 'n rol speel in sy keuse om volstruise op weiding of in 'n voerkraal af te rond.